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Report on the United Nations/International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the Latin American Experience

(Rio de Janeiro, Brazil, 5 October 2000)

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I. Introduction

A. Background and objectives

1. At its forty-second session, in 1999, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposia and conferences planned for 2000.[1] Subsequently, the General Assembly, in its resolution 54/67 of 6 December 1999, endorsed the United Nations Programme on Space Applications for 2000.

2. The United Nations/International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the Latin American Experience was held in Rio de Janeiro, Brazil, on 5 October 2000. It was the first workshop organized jointly by the Office for Outer Space Affairs of the Secretariat and the Subcommittee on Small Satellites for Developing Nations of the International Academy of Astronautics (IAA)[2] within the framework of the International Astronautical Congress.

3. At the 1999 meeting of the IAA Subcommittee, it was agreed that the fifty-first International Astronautical Congress, which was to be held in Rio de Janeiro from 2 to 6 October 2000, would be an ideal opportunity to review the status and advancement of programmes in Latin America. It was also agreed that, during the Congress, a one-day workshop should be organized in cooperation with the Office for Outer Space Affairs. It was further agreed that the workshop should be open to participants from other regions, but that the situation in Latin America would be used as an example of how developing countries could benefit from small satellites and that it should form the core of the discussion.

4. The Workshop was to be part of the follow-up to two other workshops organized by the IAA Subcommittee. At a workshop on small satellites for Latin America held in São José dos Campos, Brazil, in June 1994, the participants had expressed an interest in reviewing after a few years their conclusions and recommendations. The second workshop, the Workshop on Small Satellites at the Service of Developing Countries, had been organized within the framework of the Technical Forum held in Vienna from 18 to 23 July 1999 during the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISCPACE III) (for the conclusions and proposals, see the report of UNISPACE III[3]).

5. Thus, one of the objectives of the Workshop was to review the advancements made in Latin America in the development and utilization of small satellites in the light of the recommendations of the two other workshops organized by the IAA Subcommittee.

B. Attendance

6. The Workshop was an integral part of the International Astronautical Congress and was attended by as many as 50 registered Congress participants. Many of those attending the Workshop had also attended the United Nations/International Astronautical Federation Workshop on an Operational Strategy for Sustainable Development Using Space, held in São José dos Campos immediately before the Congress (from 28 to 30 September 2000) (A/AC.105/744). The sponsors of the workshop held in São José dos Campos in 2000 (the United Nations, the European Space Agency, the Centre national d'études spatiales (CNES) of France and the National Institute for Space Research (INPE) of Brazil) had provided financial support to selected participants from developing countries and the International Astronautical Federation had waived the registration fee for them.

7. The workshop held in Rio de Janeiro was also attended by several participants of the workshop held in São José dos Campos in 1994 and the workshop held in Vienna in 1999, who provided valuable continuity and their assessment of the progress made.

II. Summary of presentations

8. Ten papers were presented at the Workshop. Most of them described the current situation and advanced projects in Latin America and in other regions.

9. The first paper, from Brazil, presented the benefits of the Brazilian data collection satellite (SCD) system, based on two small data collection satellites, SCD-1, launched in February 1993, and SCD-2, launched in October 1998, and a set of data collection platforms distributed throughout Brazil, especially in the Amazon and north-east areas of the country. The

first benefit was a contribution of the SCD project to the development of the Brazilian capability for spacecraft design, manufacturing, testing and operation. Examples were given of the socio-economic benefits of space technology in fields such as hydrological monitoring and electric power generation; agriculture; fishery; flood monitoring and warning; monitoring and prevention of fires and other natural disasters; transportation; and water resource management for water supply and water quality control. Examples were also given of how a developing country could take advantage of space technology, using it as a tool for development and environmental protection.

10. In the field of telecommunications, a presentation was made on the national technology heritage of Brazil, which could be used to develop new satellite architecture for telecommunication systems to fulfil the particular needs of developing countries.

11. A presentation was made of a new satellite system, the Amazon Rainforest Observation System (SSR), which would benefit from the geographical position of Brazil close to the equator to develop an innovative solution to dramatically increase the revisit time and to provide near-real-time data transmission.

12. It was noted that Brazil, which had developed a large space programme, including satellite design, development and operation, especially through its SCDs, had also initiated cooperative programmes. Two such programmes were presented at the Workshop, showing various benefits of cooperative activities. The Microsatellite programme was presented as a new step in the cooperation initiated by Brazil and France. The purpose of the programme was to develop a low-cost microsatellite to carry Brazilian and French scientific and technological experiments, providing perspectives for a longer-term partnership and new opportunities. The second cooperative programme involved two countries in Latin America, Argentina and Brazil, which, because of their geographical proximity and similar environments, had initiated studies on the Argentine-Brazilian Satellite providing Information on Water, Agriculture and the Environment (SABIA3), a new satellite mission dedicated to the monitoring of water, food production and the environment. It was indicated that Argentina and Spain were currently studying Cesar, a cooperative remote sensing programme, and that Argentina, Brazil and Spain were considering the possibility of merging SABIA3 and Cesar into a trilateral programme with a view to combining efforts on a mission that would be defined by all three of those States.

13. It was stated that, in Argentina, at the universities in Córdoba and Neuquén, privately supported projects involving small and inexpensive satellites devoted to scientific and technological experiments were being undertaken as an effective means of promoting good education in space engineering and technology and of attracting talented young people to the subject. In that context, small satellites were being used as vehicles for students' personal work, for increasing their motivation and for improving the quality of the results of their work. It was mentioned that similar projects were being undertaken in Mexico. In Brazil, universities were involved in space activities through expert groups, which collaborated with each other in an effort to solve specific technical problems.

14. It was stated that, in Chile, the Satélite de la Fuerza Aérea (FASat) developed jointly with a British university as part of a programme of hands-on training leading to the development and operation of small satellites. The results achieved in one of the experiments on board FASat Bravo had demonstrated that small satellites could provide valuable scientific data. The atmospheric ozone experiment had been in continuous operation since August 1998, allowing the Chilean scientific team to carry out a detailed observation campaign to obtain ozone concentration profiles over the territory of Chile. In addition, the satellite has been used to generate daily global maps of atmospheric ozone concentrations, showing the formation and extent of the ozone "hole" over Antarctica.

15. It was stated that Peru had also initiated its national programme. Through the small remote sensing satellite of the Comisión Nacional de Investigación y Desarrollo Aeroespacial (ConidaSat), Peru intended to develop local capability and infrastructure to design and build a satellite; the project was to be a hands-on training programme. The selection of a remote sensing mission was a step towards permanent monitoring of the Peruvian territory, but some scientific experiments might also be included in the mission. In the development of its space capability, Peru had acknowledged support from Europe.

III. Conclusions and recommendations

16. The Workshop clearly demonstrated that the Latin American experience in the field of small satellites had grown substantially since 1994, when the first workshop on the subject had been held in São José dos Campos. In addition to several projects concluded or under development in Argentina, Brazil and Chile, national activity in that field had also been reported by Mexico and Peru.

17. The experiences reported covered a wide and interesting spectrum, ranging from educational nanosatellites and microsatellites in two universities in Argentina to some small-to-medium-sized, fairly sophisticated satellites devoted to operational application missions, especially for remote sensing, such as the joint initiative being studied by Argentina and Brazil.

18. The presentations made in the Workshop clearly showed that ongoing projects were able to generate some quite ingenious low-cost solutions, not only in individual educational endeavours, but also in more complex government-sponsored undertakings.

19. In the presentations, it was emphasized that, as the Latin American experience grew, it could yield practical results demonstrating that small satellites could be effective in addressing regional problems. For example, the system of environmental data collection in Brazil had already resulted in a long list of benefits.

20. The participants in the Workshop recognized that small satellite projects in Latin America were promoting international cooperation within the region, as well as with European partners. They also noted that several satellite missions developed in Latin America could be of interest to other regions, especially Africa.

21. The participants in the Workshop recognized that the proposals made during UNISPACE III were fully applicable to Latin America, but they made the following additional conclusions and recommendations that were more focused on the specific needs of the region:

(a) The Workshop recognized that the route of international cooperation was very promising and that it should be explored more in order to foster the use of small satellite systems for the benefit of Latin American and other developing countries, especially through the promotion of a larger number of regional projects. For that purpose, the Workshop recommended that coordinated action be initiated to identify significant problems that were common to different countries in a region and that could be addressed with the help of small satellite technology;

(b) Efforts had been made to develop space systems devoted to improving the quality of life in developing countries. To provide maximum benefit to the populations of such countries, the Workshop recommended that the relevant programmes be established in such a manner as to ensure continuity and sustainability;

(c) The Workshop highlighted the importance of Earth observation programmes for developing countries and the benefits of international cooperative efforts. The Workshop therefore recommended that long-term strategic cooperation agreements be prepared to ensure the definition and development of sustainable programmes;

(d) The Workshop recognized the importance of space development in education curricula, especially for motivating and training students. In line with recommendations made at UNISPACE III, the Workshop proposed that each country recognize the important role that space assets could play in education and the need to incorporate space into education and to develop among the population and among decision makers an awareness of the benefits offered by space;

(e) Finally, the Workshop identified the importance of collaboration across regions, especially the potential benefits of Africa having access to space systems developed, or similar to those developed, in Latin America. The Workshop recommended that another workshop be organized to review the needs of African countries and the benefits that small satellite systems could bring to those countries to suit their needs.

Notes

[1] *Official Records of the General Assembly, Fifty-fourth Session, Supplement No. 20* (A/54/20), para. 52.

[2] The purpose of the IAA Subcommittee on Small Satellites for Developing Nations is to assess the benefits of small satellites for developing countries and to develop awareness on the subject in both developed and developing countries. The IAA Subcommittee publishes its findings and disseminates relevant information through workshops and symposia. In order to realize its goals, the IAA Subcommittee cooperates with: the United Nations and its Committee on the Peaceful Uses of Outer Space; the International Astronautical Federation and its Committee for Liaison with International Organizations and Developing Nations; and the International Space University.

[3] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19–30 July 1999* (United Nations publication, Sales No. E.00.I.3), annex III.